

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Applicant(s) : THOMAS HAAS, ET AL.
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Title : AQUEOUS HYDROGEN PEROXIDE SOLUTIONS AND METHOD
OF MAKING SAME

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APPELLANTS' BRIEF ON APPEAL

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APPELLANT'S BRIEF ON APPEAL

A. INTRODUCTION

This appeal is from the Final Official Action from the United States Patent and Trademark Office dated January 30, 2006, finally rejecting Claims 1 to 15 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over *Tsao, et al.*, U.S. Patent 4,889,689 (*Tsao*). The advisory action of April 25, 2006 confirms the rejection of Claims 1 to 18.

Claims 16 to 18 have been objected to and would be allowable if rewritten in independent form.

A Notice of Appeal was filed on May 24, 2006, together with a one month extension of time. All necessary fees have been paid by check.

1. Real Party in Interest.

The real party in interest in this appeal and the present application is Degussa AG of Düsseldorf, Germany as evidenced by the assignment recorded in the United States Patent and Trademark Office on January 2, 2004 at Reel 014848, Frame 0502.

2. Related Appeals and Interferences.

The appellants, appellants' legal representatives, and the assignee are not aware of any related appeals or interferences that will be directly affected or have a bearing on the Board's decision in this appeal.

3. Status of Claims.

Claims 1 to 18 stand rejected and are on appeal.

Claims 16 to 18 have been objected to and would be allowed if rewritten in independent form.

Claims 19 to 27 have been allowed.

Claim 1 is the only independent claim.

The claims on appeal are set forth in Appendix A.

4. Status of Amendments.

The amendment of April 13, 2006 filed after the final action will be entered for purposes of appeal according to the Advisory Action of April 25, 2006.

The amendment does not affect the status of the rejected claims.

B. SUMMARY OF THE CLAIMED SUBJECT MATTER

Aqueous hydrogen peroxide solutions are used in methods for the epoxidation of olefins. The present invention, as expressed in Claim 1, relates to aqueous hydrogen peroxide solutions that are characterized by certain limitations on the amounts of alkali metals, alkaline earth metals, and amines having pK_B of less than 4.5 that can be present in such solutions. See application, page 1, paragraph [0002].

The majority of hydrogen peroxide that is produced today is by the well-known anthraquinone process as described in *Ullmann's Encyclopedia of Industrial Chemistry*. See application, page 1 [0003]. The present invention aims to provide an aqueous hydrogen peroxide solution that can be economically produced and that can be safely handled, stored and shipped and is suitable for the epoxidation of olefins in the presence of a heterogeneous catalyst and leads to improved long-term activity and selectivity of the catalyst. See page 6, [0021].

C. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

In the Final Official Action of January 30, 2006, Claims 19 to 27 were allowed.

Claims 16 to 18 were objected to and it was said that these claims would be allowable if rewritten in independent form.

Claims 1 to 15 were rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over *Tsao, et al.*, U.S. Patent 4,889,689 (*Tsao*). The Advisory Action of April 25, 2006 indicated the Claims 16 to 18 are included in the rejection.

Therefore, the issue on appeal is whether Claims 1 to 18 are anticipated by, or rendered *prima facie* obvious by *Tsao* '689.

Claims 2 to 15 stand or fall together and are not argued separately in the following arguments.

The subject matter of Claims 16, 17 and 18 has already been indicated as patentable provided those claims are rewritten in independent form.

D. ARGUMENT

The law regarding 35 U.S.C. §102(b).

In order for a patent or a printed publication to anticipate a claimed invention, all aspects of the invention must be found within the ambit of a single reference. Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of the claimed invention. See, The Manual of Patent Examining Procedure, Section 2131, and the citations found therein.

Claim 1 is patentable under 35 U.S.C. §102(b). The patent of *Tsao* does not anticipate the product defined in Claim 1.

Briefly summarized, *Tsao* discloses a stabilized aqueous hydrogen peroxide solution that is made physiologically tolerable to the ocular environment; see col. 2, lines 30-39. Physiologically compatible or enhancing agents are described by *Tsao* beginning in col. 3, line 3. In col. 3, lines 51-68, *Tsao* further indicates what is to be understood by physiologically tolerable to the ocular environment and teaches that physiologically acceptable tonicity enhancing agents are used as additives to obtain this intended result. The Official Action makes a point about the use of the word “may”, in col. 3 at line 51, implying thereby that the tonicity enhancing agents are only optional ingredients. However, it is stated clearly that tonicity enhancing agents function to increase the comfort levels of the hydrogen peroxide solution in the eye of the patient, col. 3, lines 58 to 63. See in particular, Example 1 of *Tsao*, which contains several sodium compounds which are examples of the tonicity enhancing agents.

Further, while the claims of *Tsao* do not recite the presence of the tonicity enhancing agent that is not a basis to allege that the reference teaches the exclusion of tonicity agents.

Tsao's invention primarily relates to the presence of the stabilizing agent diethylene triamine penta(methylene- phosphonic acid); see Claim 1 of *Tsao*, col. 4, line 61. Hence, the claims of *Tsao* clearly focus on that feature. The tonicity enhancing agents are present so that the resulting solution is substantially isotonic; this is substantially equivalent to a 0.9 % by weight aqueous sodium chloride solution; see col. 3, line 64-68.

As is evident from Example 1 of the *Tsao* reference, and the calculations set forth below, 0.8655 grams or about 0.87 wt-% sodium chloride is used to make up the hydrogen peroxide solution resulting in a content of sodium ion of about 3400 wppm absolute. The value of 3400 wppm is obtained in the following way. For the calculation of the sodium chloride content or the content of sodium ions as either weight % or in wppm (weight parts per million), it must be kept in

mind that the values referred to in weight percent are based on the total weight of the hydrogen peroxide solution. In this application, the designation “wppm of sodium ions” refers to the weight of hydrogen peroxide and not to the total weight of the solution.

Thus, the 0.8655 grams shown in Example 1 of *Tsao*, based on a total value of 100 ml (100 gram) of the hydrogen peroxide solution, is about 0.87 wt-%. To compare that value with the wppm system used in the present application, we use the following calculation:

Taking 22.99 g/mol as the atomic weight of sodium and 58.44 g/mol as the molecular weight of sodium chloride, we have:

$$0.87 \text{ wt \%} \times 22.99 \text{ g/mol} \div 58.44 \text{ g/mol} = 0.34 \text{ wt \%} \text{ or } 3400 \text{ ppm.}$$

Tsao also discloses in Example 1 a hydrogen peroxide content of 3 wt.% based on the total weight of the hydrogen peroxide solution.

Taking into account that the concentration of hydrogen peroxide in that solution is 3 wt-%, this means the weight fraction of hydrogen peroxide in the solution is 0.03. From this data, it then follows that the content of sodium ions of 3400 ppm divided by the weight fraction of hydrogen peroxide of 0.03 correlates to about 113,333 wppm based on the weight of hydrogen peroxide in said solution.

In Example 1, in addition to sodium chloride, also sodium phosphate dibasic and sodium phosphate monobasic are added and, the pH is adjusted by adding sodium hydroxide or HCl. Consequently, *Tsao* clearly teaches an isotonic hydrogen peroxide solution having a sodium ion content based on the weight of hydrogen peroxide that is higher by several orders of magnitudes (113,333 wppm) than the upper limit for the alkali metal concentration according to the claims herein which is 50 wppm. It follows that *Tsao* does not inherently teach a low alkali metal ion concentration; but on the contrary, *Tsao* teaches a very high alkali metal ion concentration in order to obtain an isotonic solution.

An alternative way for calculating the amount of sodium based on the weight of hydrogen peroxide is by calculating the weight fraction of sodium relative to hydrogen peroxide from the amounts in weight percent, given in Example 1 of *Tsao* for the same basis. Thus, weight sodium/weight hydrogen peroxide = 0.34 wt.% / 3 wt.% = 0.113 = approximately 113000 ppm based on the weight of hydrogen peroxide.

An invention has to be compared in its entirety, i.e. the combination of all features defined in the independent claims, with the prior art references as a whole, not just portions of the prior art. Claim 1 of this application calls for an aqueous solution of hydrogen peroxide having less than 50 wppm of alkali and/or alkaline earth metals, a specified defined amine content of less than 50 wppm and a concentration of anions or compounds that dissociate to form anions of at least 100 wppm. *Tsao* fails to describe this combination of features within the meaning of 35 U.S.C. § 102(b).

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co., of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ...claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Therefore, appellants respectfully submit the *Tsao* reference is insufficient as a basis for a rejection of the present independent claims, as anticipated under 35 U.S.C. § 102(b).

The Final Official Action takes the position that the claimed features are inherent in the prior art reference. The inherent teaching of a prior art reference is a question of fact and can arise in both the context of anticipation and obviousness. *In re Napier*, 55 F.3d 610, 613, 34

USPQ2d 1782, (Fed. Cir. 1995). It is also well established an allegation that a certain result or characteristic may occur or be present in the prior art is not a sufficient basis to establish the inherency of that particular result or characteristic. See, *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955 (Fed. Cir. 1993) which reversed a rejection because inherency was based on what would result due to optimization of conditions and not what was necessarily always present in the prior art. See also, *In re Oelrich*, 666 F.2d 578, 212 USPQ 323 (CCPA 1981). To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. See, *In re Robertson*, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999).

In the present case, the extrinsic evidence is lacking.

In relying upon the theory of inherency, the burden is upon the examiners to provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. See, *Ex Parte Levy*, 17 USPQ2d 1461 (BPAI 1990) and MPEP Section 2112.

It is manifest from the cases quoted above that both the courts and the PTO have emphasized that in order to sustain a rejection based on inherency, the burden is upon the examiner to establish that the claimed result would necessarily and inevitably result from the operation of the invention described in the referenced patent.

In the Final Action, it is said, "The composition of *Tsao* '689 would inherently contain less than 50 wppm alkali metals or alkaline earth metals, since there is no indication in *Tsao* '689 that such metals are present."

This statement is in clear contradiction to Example 1 in the *Tsao* reference which clearly shows a high concentration of sodium ions is present. This also contradicts the *Tsao* disclosure in col. 3, lines 30 to 45, that is relied on in the Office Action for the proposition that the hydrogen peroxide solution disclosed in the *Tsao* reference contains more than 100 wppm anions. According to this disclosure in the reference, the stabilizing anions are present in form of the alkali metal or ammonium salts.

Consequently, if the anions are present at the high concentration of at least 100 wppm, then inevitably the corresponding counter ions, i.e. alkali metal ions or ammonium ions, have to be present in a similar amount.

A rejection based on inherent disclosure of a prior art reference is only proper if the combination of features can be directly and unambiguously derived as the inevitable result flowing from the teachings of the prior art references. Since alkali metal salts and ammonium salts are disclosed as equivalent for the additional stabilizers (col. 3, lines 30-31) and since alkali metal compounds are disclosed, also for adjusting the pH and the tonicity of the solution, it is not possible that the combination of features defined in applicants' claims is directly and unambiguously derivable from the teaching of *Tsao*. That is, the limitation of less than 50 wppm alkali metals and/or alkaline earth metals could not have been arrived at from the teachings of *Tsao*. On the contrary, an informed selection from amongst the many possibilities described in the *Tsao* reference -- a selection not even remotely disclosed in *Tsao* -- would have to be made in order to arrive at a concentration of anions of more than 100 wppm and an alkali metal concentration of less than 50 wppm. Such a combination would be the selection of ethylenediamine penta(methylenephosphonic acid) and not the salt of the acid in a concentration outside the preferred range of 0.006 to 0.02 weight percent in combination with a selection of a stabilizer in

form of an ammonium salt in a concentration of more than 100 wppm. Further, and contrary to the teaching of the *Tsao* reference, a selection would have to be made that the solution is not isotonic to the eye environment.

Such an embodiment is neither disclosed nor directly and unambiguously derivable by a person skilled in the art from the overall disclosure in the *Tsao* reference. Consequently, a rejection based on inherency is fatally flawed.

Neither does *Tsao* render *prima facie* obvious the subject matter of Claim 1. In view of the fact that high amounts of alkali metal ions are shown to provide an isotonic hydrogen peroxide solution, as seen in Example 1, a person skilled in the art would not be taught by *Tsao* that a starting hydrogen peroxide solution should be used with a very low alkali metal content as required by the present invention. A person skilled in the art would immediately recognize that any commercially available hydrogen peroxide solution would not have enough sodium ions present in order to fulfill the requirement of an isotonic solution, with the result that under any circumstances additional alkali metal, especially sodium salts like sodium chloride, would have to be added to the solution to obtain the result intended to *Tsao*.

Furthermore, the argument that *Tsao* does not mention alkali metal ions in the claims and, therefore, alkali metal ions need not be present is not a proper basis for a rejection based on 35 U.S.C. § 103(a). It is well known and also documented by the other cited prior art that commercial hydrogen peroxide solutions contain high amounts of alkali metal ions and/or amines; see U.S. Patent 4,981,662 of record. Consequently, the fact that alkali metal ions are not mentioned in the claims of *Tsao* is no basis for alleging that they are, in fact, not present. Using commercial hydrogen peroxide solutions without any further treatment or selection of specific hydrogen peroxide solutions with a very low alkali metal ion content would inevitably result in an alkali

metal ion concentration of above the limits as presently claimed. Furthermore, a person skilled in the art reading the *Tsao* reference would by no means be motivated to select a commercial hydrogen peroxide solution with explicitly low alkali metal ion concentration or to treat a commercial hydrogen peroxide solution in order to remove the alkali metal ions since according to the teaching of *Tsao* an isotonic hydrogen peroxide solution is most preferred. A person skilled in the art would immediately realize that, when making this solution, alkali metal ions have to added in order to obtain the desired tonicity. Consequently, there is no reason at all to use expensive starting material or additional process steps in order to reduce the alkali metal ion concentration.

Therefore, there is no reason in the reference leading a person skilled in the art to start from a hydrogen peroxide solution that is extremely low in alkali metal ion content. Appellants respectfully submit the teaching of *Tsao* fails to render obvious the subject matter of present Claims 1 to 18. On the contrary, the person skilled in the art is directed into a totally different direction, i.e. to use a hydrogen peroxide solution that has already an inherently high ionic concentration in order to reduce the amount of additional salts to be added when making the hydrogen peroxide solution.

Claim 2 differs from Claim 1 by specifying that the amount of components of group (i) in total is less than 40 wppm, based on the weight of hydrogen peroxide. The cited reference does not show or suggest this feature.

Claim 3 differs from Claim 1 by specifying that the amount of components of group (i) in total is less than 35 wppm, based on the weight of hydrogen peroxide. This feature is not shown or suggested in the cited reference.

Claim 4 differs from Claim 1 by specifying that the amount of components of group (ii) in total is less than 40 wppm based on the weight of hydrogen peroxide. The cited reference does not show or suggest this feature.

Claim 5 differs from Claim 1 by specifying that the amount of components of group (ii) in total is less than 30 wppm based on the weight of hydrogen peroxide. This feature is also not shown or suggested in the cited reference.

Claim 6 differs from Claim 1 by specifying that the amount of components of group (ii) in total is less than 20 wppm based on the weight of hydrogen peroxide and this feature is also not shown or suggested in the cited reference.

Claim 7 differs from Claim 1 by specifying that the amount of components of group (ii) in total is less than 10 wppm based on the weight of hydrogen peroxide. This feature, likewise, is not shown or suggested in the cited reference.

Claim 8 differs from Claim 1 by specifying that the amines are selected from the group consisting of primary, secondary and tertiary alkylamines. The cited reference does not mention amines of any kind.

Claim 9 differs from Claim 1 by specifying that the solution further comprises (iv) at least 100 wppm of bases with a pK_B of at least 4.5 or the corresponding protonated compounds in total based on the weight of hydrogen peroxide. The cited reference is totally silent on this feature.

Claim 10 differs from original Claim 9 by further specifying that the amount of components of group (iv) in total is 3,000 wppm at most, based on the total weight of hydrogen peroxide. This cited reference does not show or suggest a component corresponding to group iv.

Claim 11 differs from Claim 9 by specifying that the amount of components of group (iv) in total is from 150 to 2,000 wppm based on the total weight of hydrogen peroxide. This feature is not shown or suggested in the cited reference.

Claim 12 differs from Claim 9 by specifying that the amount of components of group (iv) in total is from 200 to 1,500 wppm based on the total weight of hydrogen peroxide. This feature is not shown or suggested in the cited reference.

Claim 13 differs from Claim 9 by specifying that the components of group (iv) is in total from 300 to 1,200 wppm based on the total weight of hydrogen peroxide. This feature is not shown or suggested in the cited reference.

Claim 14 differs from original Claim 9 by specifying that the basis of group iv are selected from organic amines and amides having a pK_B of at least 4.5, organic hydroxylamines having a pK_B of at least 4.5, ammonia and hydroxylamine. The cited reference is totally silent on those aspects.

For the same reason, Claim 15 is not anticipated, nor rendered obvious, by the cited reference.

Claim 16 differs from Claim 1 by specifying that the concentration of hydrogen peroxide is more than 50% by weight based on the total weight of the hydrogen peroxide solution. This feature has already been acknowledged as being patentable and, consequently, Claims 17 and 18 which depend on Claim 16 are also submitted to be patentable.

The law regarding 35 U.S.C. §103(a).

The Manual for Patenting and Examining Procedure has established that the controlling case law is provided by the Supreme Court in *Graham v. John Deere*, 383 U.S.1, 148 U.S.Q. 459 (1966) and involves the four factual inquiries as a background for determining obviousness as follows:

- a. determining the scope and content of the prior art;
- b. ascertaining the differences between the prior art and the claims and issues;
- c. resolving the level of ordinary skill in the pertinent art; and
- d. evaluating evidence of secondary considerations.

E. CONCLUSION

Appellants have described the scope and content of the *Tsao* patent.

The differences between the *Tsao* patent and the claims herein have been identified as the absence of any designation or suggestion of the limitation on amounts of alkali metal/alkaline earth metal, limitations on amounts of amines having a pkb of less than 4.5; and at least 100 wppm of amines or compounds that can dissociate to form amines.

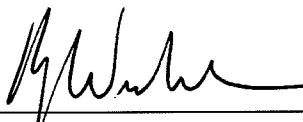
The level of ordinary skill in the art is at least equal to that of patentee *Tsao* and there is no evidence of secondary considerations of record.

Therefore, in the absence of any evidence from the side of the Examiner on the issue of inherency, the rejection should be reversed.

The granting of this appeal is respectfully requested.

Respectfully submitted,

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APPENDIX A

Claims 1-18

1. (Previously Presented) An aqueous hydrogen peroxide solution comprising:
 - less than 50 wppm alkali metals, alkaline earth metals or combinations thereof in total, irrespective whether the alkali metals or alkaline earth metals are present in cationic or complex form;
 - less than 50 wppm of amines having a pK_B of less than 4.5 or the corresponding protonated compounds in total; and
 - at least 100 wppm anions or compounds that can dissociate to form anions in total, the wppm being based on the weight of hydrogen peroxide.
2. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the amount of components of group i) in total is less than 40 wppm, based on the weight of hydrogen peroxide.
3. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the amount of components of group i) in total is less than 35 wppm, based on the weight of hydrogen peroxide.
4. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the amount of components of group ii) in total is less than 40 wppm based on the weight of hydrogen peroxide.
5. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the amount of components of group ii) in total is less than 30 wppm based on the weight of hydrogen peroxide.
6. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the amount of components of group ii) in total is less than 20 wppm based on the weight of hydrogen peroxide.
7. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the amount of components of group ii) in total is less than 10 wppm based on the weight of hydrogen peroxide.
8. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the amines are selected from the group consisting of primary, secondary and tertiary alkyl amines.
9. (Original) The aqueous hydrogen peroxide solution of claim 1, further comprising:
 - (iv) at least 100 wppm of bases having a pK_B of at least 4.5 or the corresponding protonated compounds in total based on the weight of hydrogen peroxide.
10. (Original) The aqueous hydrogen peroxide solution of claim 9, wherein the amount of components of group iv) in total is 3000 wppm at most, based on the total weight of hydrogen peroxide.

11. (Original) The aqueous hydrogen peroxide solution of claim 9, wherein the amount of components of group iv) in total is from 150 to 2000 wppm, based on the total weight of hydrogen peroxide.

12. (Original) The aqueous hydrogen peroxide solution of claim 9, wherein the amount of components of group iv) in total is from 200 to 1500 wppm, based on the total weight of hydrogen peroxide.

13. (Original) The aqueous hydrogen peroxide solution of claim 9, wherein the amount of components of group iv) in total is from 300 to 1200 wppm, based on the total weight of hydrogen peroxide.

14. (Original) The aqueous hydrogen peroxide solution of claim 9, wherein the bases of group iv) are selected from organic amines and amides having a pK_B of at least 4.5, organic hydroxylamines having a pK_B of at least 4.5, ammonia and hydroxylamine.

15. (Original) The aqueous hydrogen peroxide solution of claim 14, wherein the bases of group iv) is ammonia.

16. (Original) The aqueous hydrogen peroxide solution of claim 1, wherein the concentration of hydrogen peroxide is more than 50% by weight based on the total weight of the hydrogen peroxide solution.

17. (Original) The aqueous hydrogen peroxide solution of claim 16, wherein the concentration of hydrogen peroxide is more than 60% by weight based on the total weight of the hydrogen peroxide solution.

18. (Original) The aqueous hydrogen peroxide solution of claim 16, wherein the concentration of hydrogen peroxide is from 60 to 70% by weight by weight based on the total weight of the hydrogen peroxide solution.

APPENDIX B

EVIDENCE APPENDIX

None

APPENDIX C

RELATED PROCEEDINGS APPENDIX

None